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CANON KABUSHIKI KAISHA, 3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP).

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(71) Applicant (for all designated States except US): CANON KABUSHIKI KAISHA [JP/JP]; 3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP).

(72) Inventors; and

(75) Inventors/Applicants (for US only): MASUMOTO, Kazuyuki [JP/JP]; c/o CANON KABUSHIKI KAISHA, 3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP). KAMADA, Masashi [JP/JP]; c/o CANON KABUSHIKI KAISHA, 3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP). YANO, Kentaro [JP/JP]; c/o CANON KABUSHIKI KAISHA, 3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP). YAMADA, Akitoshi [JP/JP]; c/o CANON KABUSHIKI KAISHA, 3-30-2, Shimomaruko, Ohta-ku, Tokyo 146-8501 (JP).

(74) Agent: OHTSUKA, Yasunori; 7th FL., SHUWA KIOI-CHO PARK BLDG., 3-6, KIOICHO, CHIYODA-KU, Tokyo 102-0094 (JP).

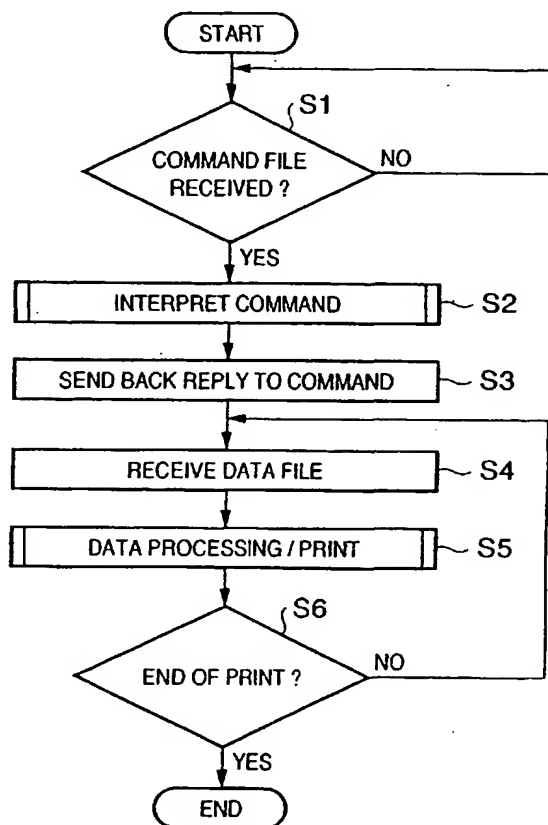
(71) Applicant and

(72) Inventor: HIRABAYASHI, Hiromitsu [JP/JP]; c/o

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(54) Title: PRINTING APPARATUS, CONTROL METHOD THEREFOR, AND STORAGE MEDIUM



(57) Abstract: A photo-direct printer apparatus which prints an image on the basis of image data from a digital camera, memory card, or PC serving as an image data source receives a control command from the image data source, interprets the control command, and receives image data from the image data source on the basis of the command. The printer apparatus decodes and processes the received image data, and generates and prints print data and print an image based on the print data.

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DESCRIPTION
PRINTING APPARATUS, CONTROL METHOD THEREFOR,
AND STORAGE MEDIUM

5 TECHNICAL FIELD

The present invention relates to a printing apparatus which receives image data from an image sensing apparatus such as a digital camera, a memory, or the like and prints the image data on a print
10 medium, a control method therefor, and a storage medium.

BACKGROUND ART

In recent years, digital cameras (image sensing
15 apparatuses) capable of photographing an image by a simple operation and converting the image into digital image data have widely been used. To print an image photographed by this camera and use the print as a photograph, the photographed digital image data is
20 temporarily input from the digital camera to a PC (computer), and undergoes image processing by the PC. Then, the processed data is output from the PC to a color printer, which prints the data.

To the contrary, there have been developed color
25 print systems capable of directly transferring digital image data from a digital camera to a color printer and printing the data without the mediacy of any PC, and

a storage medium.

The feature of a printing apparatus of the present invention is as follows:

A printing apparatus for printing an image on the basis of image data from an image data source, comprises printing means for printing an image on a print medium on the basis of print data; command determination means for interpreting a control command from the image data source and determining a content designated by the control command; image processing means for processing image data from the image data source on the basis of a determination result by the command determination means; and print control means for generating print data on the basis of the image data processed by the image processing means, outputting the print data to the printing means, and printing the print data.

Other features and advantages of the present invention will be apparent from the following descriptions taken in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the figures thereof.

BRIEF DESCRIPTION OF DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification,

multitask arrangement in which a task is assigned to each functional module in the control program of the photo-direct printer apparatus according to the embodiment;

5 Fig. 9 is a flow chart showing the outline of reception/print processing of a command and image data by a DSP according to the first embodiment;

 Fig. 10 is a chart showing communication procedures between a host and a photo-direct printer
10 apparatus according to the first embodiment;

 Fig. 11 is a flow chart showing command interpretation processing in step S2 of Fig. 9 according to the first embodiment;

 Fig. 12 is a flow chart showing data processing
15 in step S5 of Fig. 9;

 Fig. 13 is a block diagram for explaining the second embodiment of the present invention in which a host which transmits a command file to the photo-direct printer apparatus and a host which transmits a data
20 file are different apparatuses;

 Fig. 14 is a block diagram for explaining the connection form between a photo-direct printer apparatus and a plurality of hosts according to the second embodiment;

25 Fig. 15 is a flow chart showing reception/print processing of image data from a host by the photo-direct printer apparatus according to the second

storage medium such as a memory card, and a function of receiving image data from a digital camera and printing the data.

In Fig. 1, the main body which defines the casing
5 of the photo-direct printer 1000 according to the embodiment has casing members: a lower case 1001, upper case 1002, access cover 1003, and discharge tray 1004. The lower case 1001 forms almost the lower half of the printer 1000, whereas the upper case 1002 forms almost
10 the upper half of the main body. A combination of these cases forms a hollow structure with a storage space where each mechanism (to be described later) is stored. The upper and front surfaces have openings. The discharge tray 1004 is rotatably held at one end by
15 the lower case 1001, and the opening in the front surface of the lower case 1001 is opened/closed by rotating the discharge tray 1004. To execute print operation, the discharge tray 1004 is rotated toward the front side to open the opening. Print sheets can
20 be discharged from the opening, and the discharged print sheets can be sequentially stacked. The discharge tray 1004 houses two auxiliary trays 1004a and 1004b. These trays are pulled out to enlarge/reduce the paper support area in three stages,
25 as needed.

The access cover 1003 is rotatably held at one end by the upper case 1002 so as to open/close the

which is detachable from the apparatus main body and is used to display an image of one frame, an index image, and the like when images stored in the PC card are searched for an image to be printed; and 1012, a USB
5 terminal for connecting a digital camera (to be described later). A USB bus connector for connecting a personal computer (PC) is attached to the back side (not shown) of the apparatus main body.

Fig. 2 is a schematic perspective view showing
10 the structure of the print head of the photo-direct printer 1000 according to the embodiment.

As shown in Fig. 2, a print head cartridge 1200 in this embodiment comprises ink tanks 1300 which store inks, and a print head 1301 which discharges inks
15 supplied from the ink tanks 1300 from nozzles in accordance with print information. The print head 1301 is a so-called cartridge which is detachably mounted on a carriage 1102. In printing, the print head cartridge 1200 is reciprocally moved along the carriage axis, and
20 a color image is printed on a print sheet along with the movement. To realize photographic high-quality color printing, independent ink tanks of, e.g., black, light cyan (LC), light magenta (LM), cyan, magenta, and yellow are prepared as ink tanks for the print head
25 cartridge 1301. Each ink tank is freely detachable from the print head 1301.

The embodiment will exemplify the use of the

(index printing, printing of all frames, printing of one frame, printing of a designated frame, or the like) every time the key 2002 is pressed. A corresponding one of LEDs 2003 is turned on accordingly. Reference numeral 2004 denotes a maintenance key for performing printer maintenance such as cleaning of the print head 1301; 2005, a print start key which is pressed to designate the start of printing or establish maintenance setting; and 2006, a print stop key which is pressed to stop printing or designate to stop maintenance.

The arrangement of the main part concerning control of the photo-direct printer 1000 according to the embodiment will be explained with reference to Fig. 4. In Fig. 4, the same reference numerals as in the foregoing drawings denote the same parts, and a description thereof will be omitted.

In Fig. 4, reference numeral 3000 denotes a controller (control board); numeral 3001 denotes an ASIC (application specific LSI) whose arrangement will be described in detail below with reference to the block diagram of Fig. 5; numeral 3002 denotes a DSP (Digital Signal Processor) which incorporates a CPU and performs various control processes of the whole apparatus (to be described later), and image processes such as conversion from a luminance signal (RGB) to a density signal (CMYK), scaling, gamma conversion, and

Fig. 5 is a block diagram showing the arrangement of the ASIC 3001. Also in Fig. 5, the same reference numerals as in the foregoing drawings denote the same parts, and a description thereof will be omitted.

5 Reference numeral 4001 denotes a PC card interface which reads image data stored in the mounted PC card 3011 or writes data in the PC card 3011; and numeral 4002 denotes an IEEE 1284 interface which exchanges data with the printer engine 3004. The IEEE
10 1284 interface 4002 is used to print image data stored in the digital camera 3012 or PC card 3011. Reference numeral 4003 denotes a USB interface which exchanges data with the PC 3010; numeral 4004 denotes a USB host interface which exchanges data with the digital camera
15 3012; numeral 4005 denotes an operation panel interface which receives various operation signals from the operation panel 1010 or outputs display data to the display 1006; numeral 4006 denotes a viewer interface which controls display of image data on the viewer
20 1011; numeral 4007 denotes an interface which controls an interface between various switches and LEDs 4009, and the like; numeral 4008 denotes a CPU interface which controls data exchange between these interfaces and the DSP 3002; and numeral 4010 denotes an internal
25 bus (ASIC bus) which is connected to these units. The DSP 3002 executes image processes such as conversion from a luminance signal (RGB) to a density signal

3002, and image processing/process processing 6003.

Fig. 7 is a functional block diagram showing in more detail the functional arrangement concerning image processing control of the photo-direct printer 1000

5 according to the embodiment. Also in Fig. 7, the same reference numerals as in the foregoing drawings denote the same parts, and a description thereof will be omitted.

In Fig. 7, image data or JPEG-compressed image
10 data input from the PC card 3011, camera 3012, or PC 3010 via an interface 7005 such as a USB bus interface is temporarily stored in an image buffer 7000. For compressed data, the data is decompressed by a JPEG decompressor 7006. Y, Cb, and Cr signals are converted
15 into R, G, and B signals, which are stored in an RGB buffer 7001. Reference numeral 7010 denotes an X/Y scaling unit which changes the X and/or Y size of image data stored in the RGB buffer 7001. 3D3 (7007) converts the color space of R, G, and B data by looking
20 up a loop-up table 7009. 3D6 (7008) converts R, G, and B signals into signals of six colors: C, M, Y, K, LC (Light Cyan), and LM (Light Magenta) by looking up the loop-up table 7009. Reference numeral 7011 denotes a 1D output unit which executes color processing such as
25 γ conversion by looking up a one-dimensional table 7012. Reference numeral 7014 denotes an error diffusion (ED) unit which executes error diffusion

overall system such as sequence control and exclusive processing accompanying the issue of an event and the end of an event between tasks; numeral 8001 denotes a key event task which executes analysis of a pressed key or the like on the basis of key operation on the operation panel 1010; numeral 8002 denotes a display task to the LCD display 1006 that is activated upon generation of UI control, a message display request, or the like on the display 1006, and executes display control of the display 1006; numeral 8003 denotes a task which is activated by read/write from/in the PC card 3011 or data input/output via IEEE 1394, Bluetooth, or the like; numeral 8004 denotes a USB printer task which is activated by data transfer from the PC 3010 connected via a USB bus, starts by a USB printer interrupt, and executes a PC printer function; numeral 8005 denotes a task which is activated by the system control task 8000 to initialize firmware, or activates/ends a USB control task or USB bulk task as a low-order task in accordance with a message from the system control task 8000; numeral 8006 denotes a task which is activated by a USB task, and executes data read from the digital camera 3012 connected via a USB, various communication control operations, and the like; numeral 8007 denotes a file task which performs input/output control such as file open, close, read, or write; numeral 8008 denotes a task which is activated

In step S1, it is determined whether a command file has been received from a PC 3010, a digital camera 3012, a game machine, a television device, or the like functioning as a host. The command file assumes to
5 contain, as parameters, print conditions such as the number of prints, print paper size, and print quality. If YES in step S1, the process proceeds to step S2 and a command contained in the received command file is interpreted. The process proceeds to step S3, and
10 sends back information about whether printing based on the command is possible, to the host which has transmitted the command on the basis of the interpretation of the command. The host which has been notified by the reply that printing is possible
15 transmits image data to be printed to the photo-direct printer 1000.

The process proceeds to step S4, and data file transmitted by the host is received. Then the process proceeds to step S5, the data received from the host is
20 decoded and is converted into print data suitable for a printer engine 3004. Then the print data is outputted to the printer engine 3004, and print operation is performed. The process proceeds to step S6, it is determined whether the entire data file from the host
25 has been printed. If YES in step S6, the process returns to step S4 and repeats reception, decoding, and print processing of a data file.

the host is checked and it is determined whether the command format of the received command file is processible by the photo-direct printer 1000, i.e., the command format is proper. If NO in step S11, the DSP
5 3002 ends the processing, and transmits to the host in step S3 (Fig. 9) a message that the command cannot be accepted. If YES in step S11, the process proceeds to step S12 and a paper size designated for printing from the command file is read out. Accordingly, the paper
10 size used for printing is determined. The process proceeds to step S13, the number of print pages from the command file is read out, and then proceeds to step S14, print direction information is read out. That is, whether the print direction is the portrait or
15 landscape direction of a paper sheet is determined. The process proceeds to step S15 and setting information about the margin on a paper sheet is read out. This setting information designates upper, lower, left, and right margin values on a paper sheet.
20 To print a plurality of images on one paper sheet, a layout parameter is read out as an optional parameter.

If the command file is normally interpreted, a message that the command has normally been accepted is
25 transmitted to the host in step S3 (Fig. 9) from the printer 1000.

Fig. 12 depicts a flow chart showing data

transmitted from a host serving as a data transmission source to the photo-direct printer 1000 and can be printed without transmitting any complicated command corresponding to the data file format.

5 [Second Embodiment]

Fig. 13 is a block diagram showing a case where a host which transmits a command file to a photo-direct printer 1000 and a host which transmits a data file are different from each other.

10 In this example, a host 1310 transmits a command to the photo-direct printer 1000, and receives a reply to the command from the printer 1000. If the command can be accepted by the printer 1000, a host 1311 transmits image data to the photo-direct printer 1000,
15 and designates printing corresponding to the command.

Alternatively, as shown in Fig. 14, a plurality of hosts may transmit image data to the photo-direct printer 1000. In this case, information about a transmission source (e.g., host ID information and the
20 number of transmission devices) is transmitted in advance as a command parameter to the photo-direct printer 1000. This allows the photo-direct printer 1000 to receive and print image data from only designated hosts without receiving and processing image
25 data from a host not registered in the parameter. These hosts may be different apparatuses such as a personal computer, digital camera, digital video

original mode in which the printer 1000 can receive and print image data from another host.

After processing of receiving and printing image data from the designated hosts, the photo-direct
5 printer 1000 may notify the host 1400 serving as the command transmission source of the end of the reception only mode for the designated hosts.

Fig. 15 is a flow chart showing reception/print processing of image data from a host by the
10 photo-direct printer 1000 according to the second embodiment.

If the photo-direct printer 1000 receives image data from a host in step S51, the process proceeds to step S52 and it is checked whether the ID of the host
15 which has transmitted the image data has been in advance registered in the printer 1000. If NO in step S52, the process proceeds to step S53 and a negative acknowledgement (NACK) is sent back to the host without receiving the image data.

20 If the ID of the host has been registered in advance in step S52, the process proceeds to step S54 and the image data is received and an ACK signal is sent back to the host. In step S55, similar to step S5 in Fig. 9, the photo-direct printer 1000 executes
25 processing of the received data and print processing. Then, the process proceeds to step S56 and it is checked whether print processing by reception of the

transmission sources (hosts) can be received and printed.

[Third Embodiment]

Fig. 16 is a flow chart showing control
5 processing in a photo-direct printer 1000 according to the third embodiment which receives a command from a host, receives image data via different I/Fs, and prints the image data.

Fig. 17 is a block diagram showing a state in
10 which first and second hosts 1600 and 1601 are connected to the photo-direct printer 1000 via different I/Fs. In Fig. 17, the host 1600 and photo-direct printer 1000 are connected via interface A. The photo-direct printer 1000 receives a command
15 from the host 1600, determines whether the command is acceptable, and sends back a reply to the command in accordance with the determination result. The photo-direct printer 1000 is also connected to the host 1601 via interface B. The photo-direct printer 1000
20 receives image data from the host 1601, processes the image data received from the host 1601 in accordance with a command from the host 1600, and executes printing.

In Fig. 16, it is checked in step S31 whether a
25 command file is received from the host 1600. As described above, the command file contains, as parameters, print conditions such as the number of

image data from the host 1601 has been completed. If
NO in step S37, the process returns to step S35 and the
above-described processing is executed. After printing
ends, the process advances to step S38, the I/F is
5 switched to the interface A by referring to the ID of
the original I/F (interface A) stored in step S34, and
it shifts to the standby state.

As described above, according to the third
embodiment, reception of a command and print processing
10 based on the command can be executed even when a
command transmission source and image data transmission
source are different from each other.

[Fourth Embodiment]

Fig. 18 is a flow chart showing control
15 processing of receiving image data from a host and
outputting a data processing result in the photo-direct
printer 1000 according to the fourth embodiment of the
present invention. The fourth embodiment will
exemplify the photo-direct printer 1000 having a
20 plurality of memory means. For example, the
photo-direct printer 1000 has two PC card I/F means,
can store image data in two PC cards, and can read out
image data from the two PC cards to print the data.

In step S41, it is checked whether a command file
25 is received from a host. The command contains
parameters such as the contents of image data, image
size, and image format. If a proper command file is

has completely ended. If YES in step S48, the process proceeds to step S49 and a data processing list is outputted.

The fourth embodiment has exemplified the printer apparatus having a plurality of PC cards. In addition, the printer apparatus may have a plurality of interfaces such as a memory stick interface and SD card interface.

As described above, according to the fourth embodiment, received data can be saved in another substitute memory.

The present invention may be applied to a system constituted by a plurality of devices (e.g., a host computer, interface device, reader, and printer) or an apparatus (e.g., a copying machine or facsimile apparatus) formed from a single device.

The object of the present invention is also achieved when a storage medium (or recording medium) which stores software program codes for realizing the functions of the above-described embodiments is supplied to a system or apparatus, and the computer (or the CPU or MPU) of the system or apparatus reads out and executes the program codes stored in the storage medium. In this case, the program codes read out from the storage medium realize the functions of the above-described embodiments, and the storage medium which stores the program codes constitutes the present

saving sensed image data have recently been known. Instead of the digital camera described in the embodiments, such a cell phone can be connected via a connection cable.

5 As a portable information terminal, PDAs (Personal Digital Assistances) having a liquid crystal monitor capable of displaying an image and a memory capable of saving a sensed image have recently been spread. Such a PDA can be connected via a connection
10 cable to print saved image data, similar to the digital camera in the embodiments.

 The photo-direct printer apparatus according to the embodiments can implement the functions of a PC printer, camera printer, and memory printer by single
15 printer apparatus.

 The present invention is not limited to the above embodiments and various changes and modifications can be made within the spirit and scope of the present invention. Therefore, to apprise the public of the
20 scope of the present invention, the following claims are made.

the plurality of image data sources and determining a content designated by the control command;

image processing means for processing image data from an image data source other than the first image data source on the basis of a determination result by
5 said command determination means; and

print control means for generating print data on the basis of the image data processed by said image processing means, outputting the print data to said
10 printing means, and printing the print data.

3. The printing apparatus according to claim 2, wherein the control command contains designation information for designating the image data source
15 capable of supplying the image data to the printing apparatus out of the plurality of image data sources.

4. The printer apparatus according to claim 3, further comprising inhibition means for inhibiting
20 reception of the image data from an image data source other than the image data source designated by the designation information.

5. The printing apparatus according to claim 2, wherein the control command contains a command for
25 designating switching of interfaces for connecting the plurality of image data sources.

another storage unit switched by said switching means on the basis of an access request from the first image data source.

5 8. The printing apparatus according to claim 7, wherein at least one of the storage units includes a card memory.

9. A method of controlling a printing apparatus for
10 printing an image on the basis of image data from an image data source, comprising:

a command determination step of interpreting a control command from the image data source and determining a content designated by the control

15 command;

an image processing step of processing image data from the image data source on the basis of a determination result in said command determination step; and

20 a print control step of generating and printing print data on the basis of the image data processed in said image processing step.

10. A method of controlling a printing apparatus for
25 printing an image on the basis of image data from a plurality of image data sources, comprising:

a command determination step of interpreting a

14. The printing apparatus control method according to claim 10, wherein the plurality of image data sources include at least a digital image sensing apparatus for outputting a sensed image signal by a digital signal, a
5 memory card for storing image data, and a computer device.

15. A method of controlling a printing apparatus for
10 printing an image on the basis of image data from a plurality of image data sources, comprising:

a command determination step of interpreting a control command from a first image data source out of the plurality of image data sources and determining a
15 content designated by the control command;

a switching step of, when an access request to a storage unit via a first interface unit is determined in said command determination step, determining whether access to the storage unit via the first interface unit
20 is possible, and if impossible, switching to access to another storage unit via a second interface unit; and

a control step of controlling access to the another storage unit switched in said switching step on the basis of an access request from the first image
25 data source.

16. The printing apparatus control method according

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FIG. 1

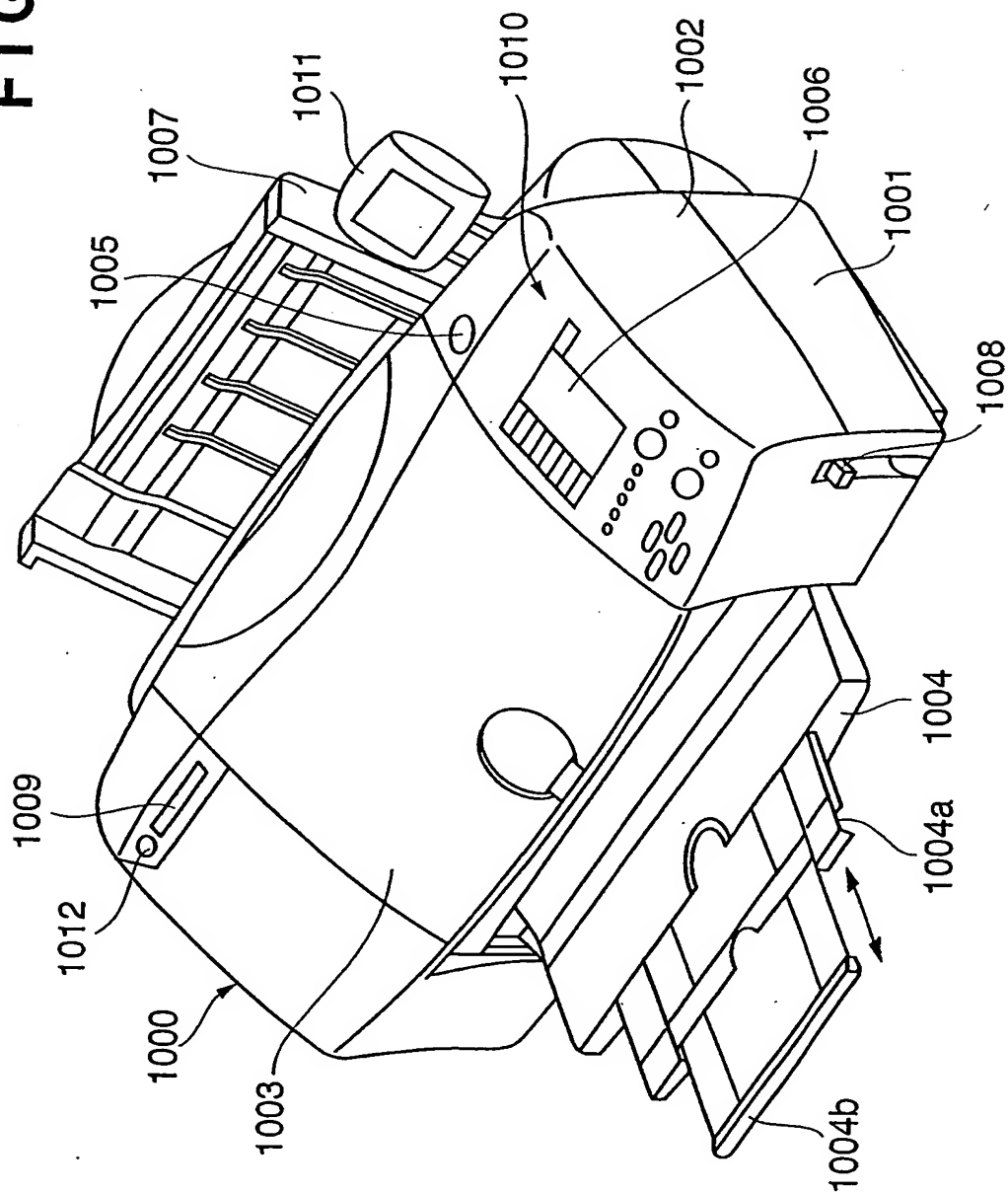
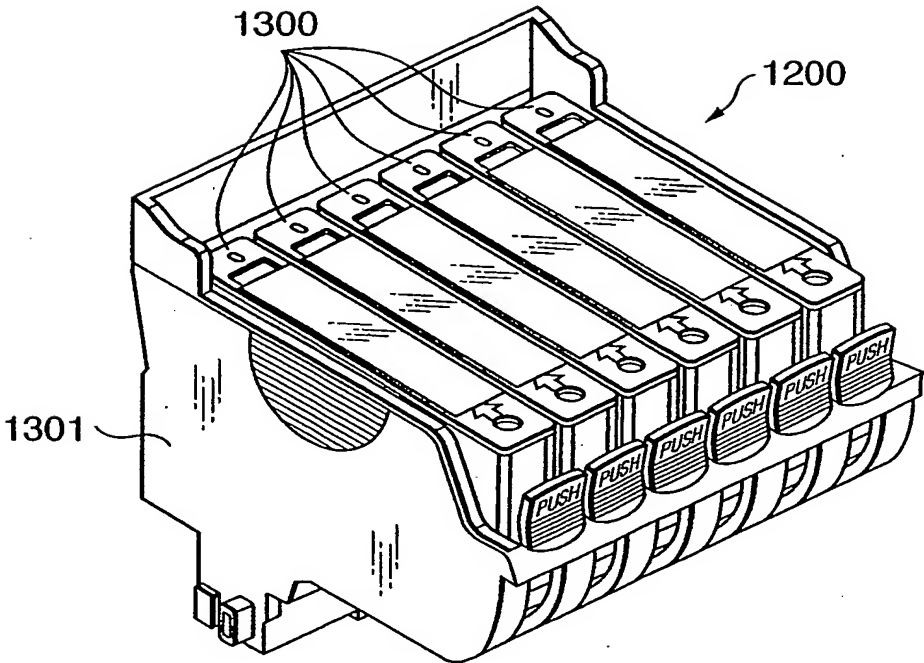
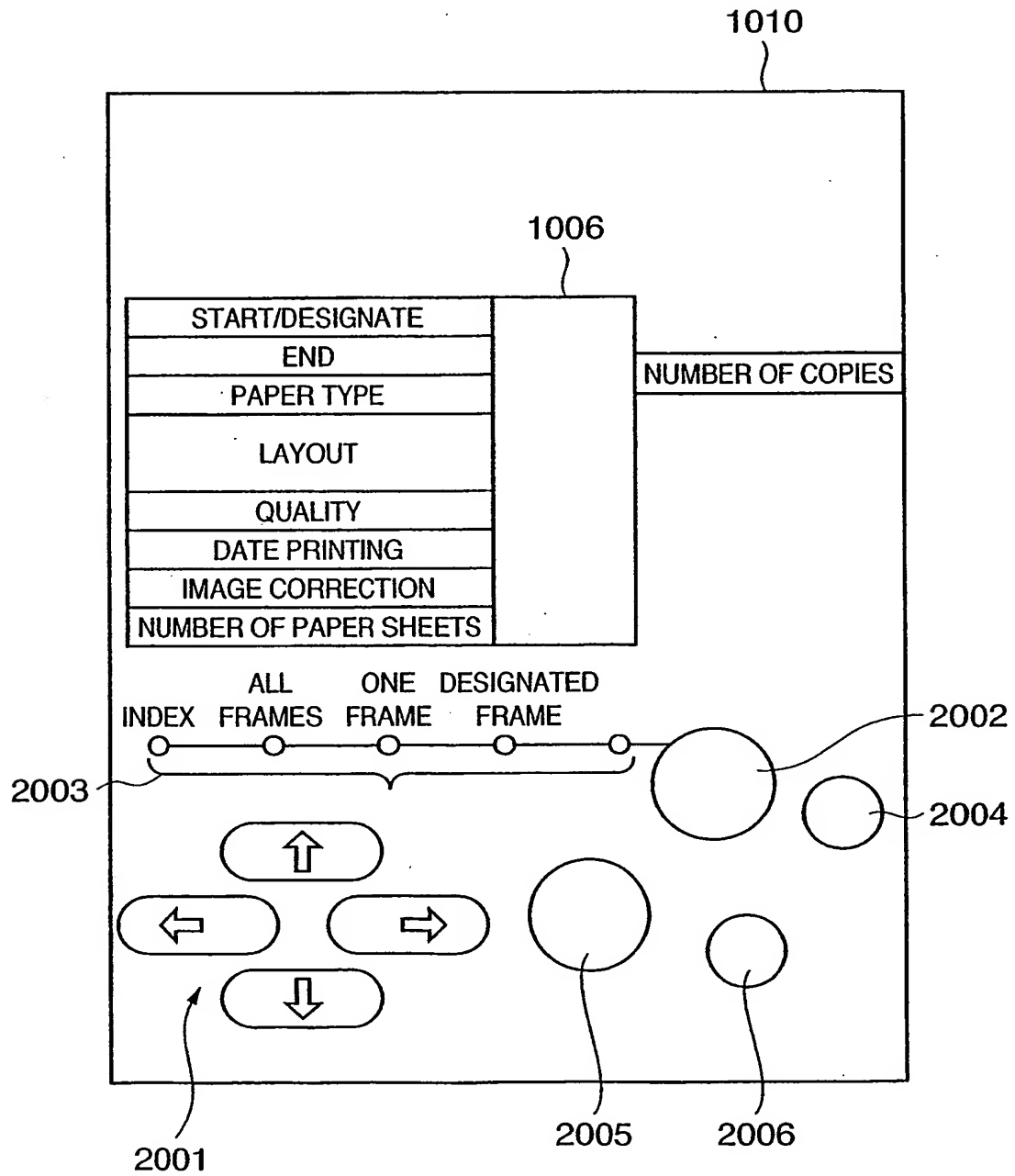


FIG. 2

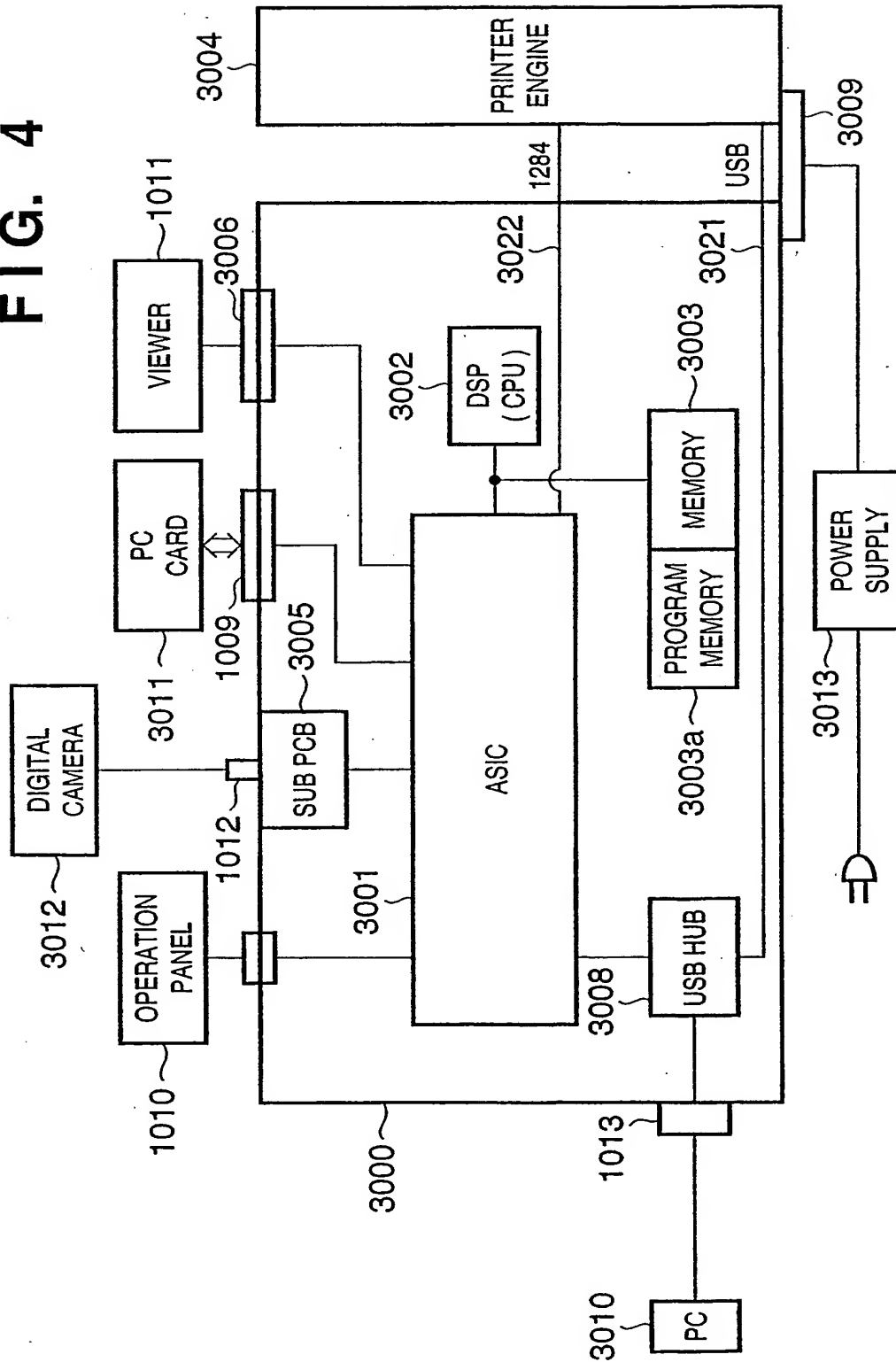


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FIG. 3

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FIG. 4



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FIG. 5

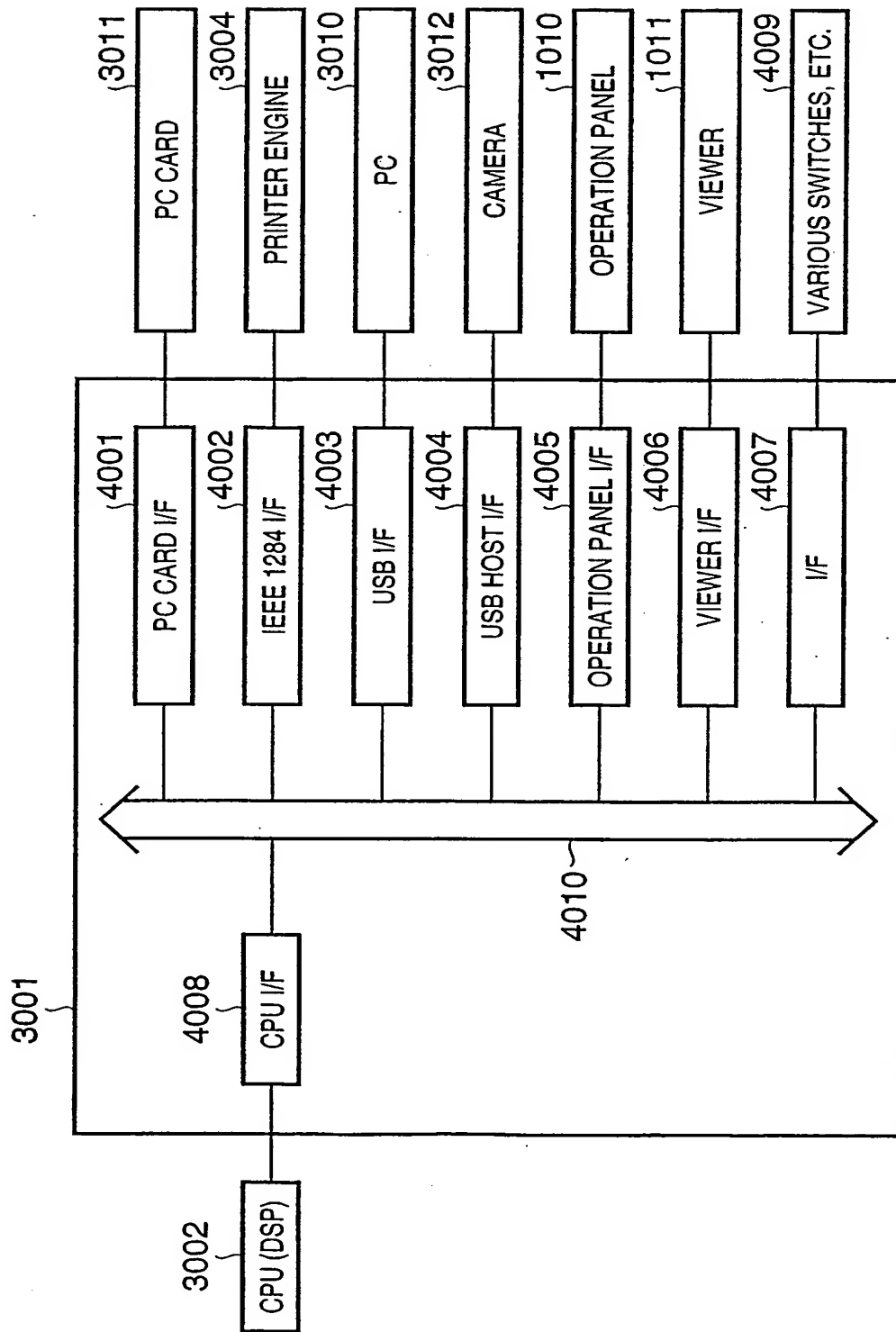


FIG. 6

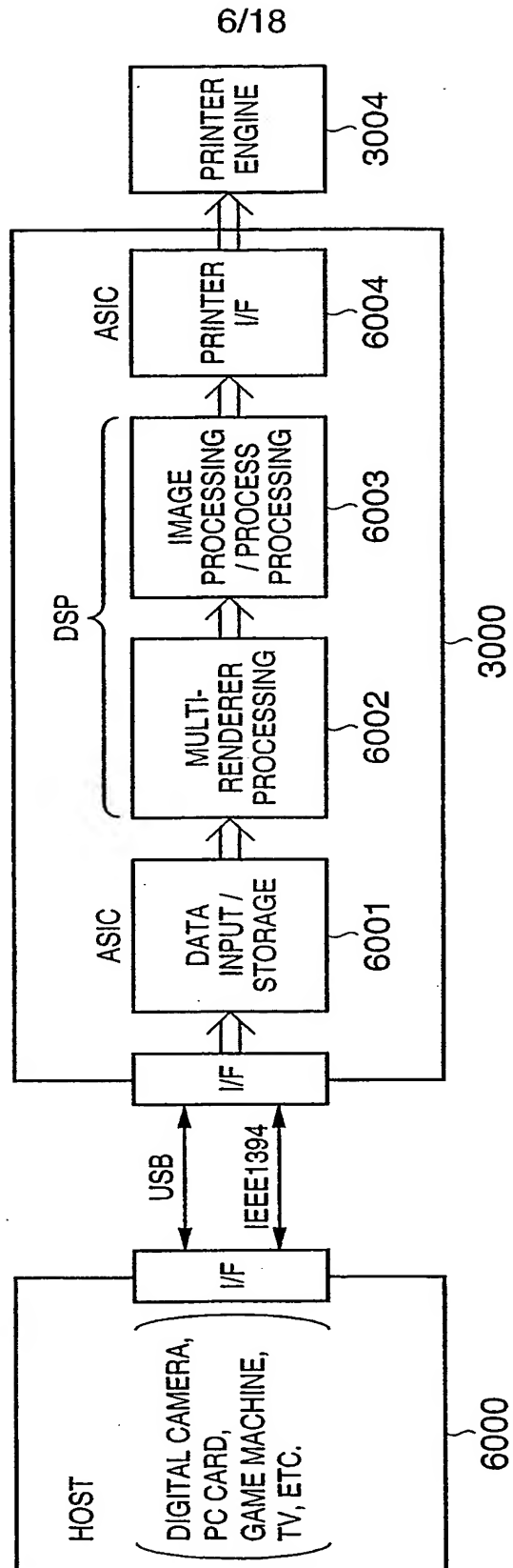
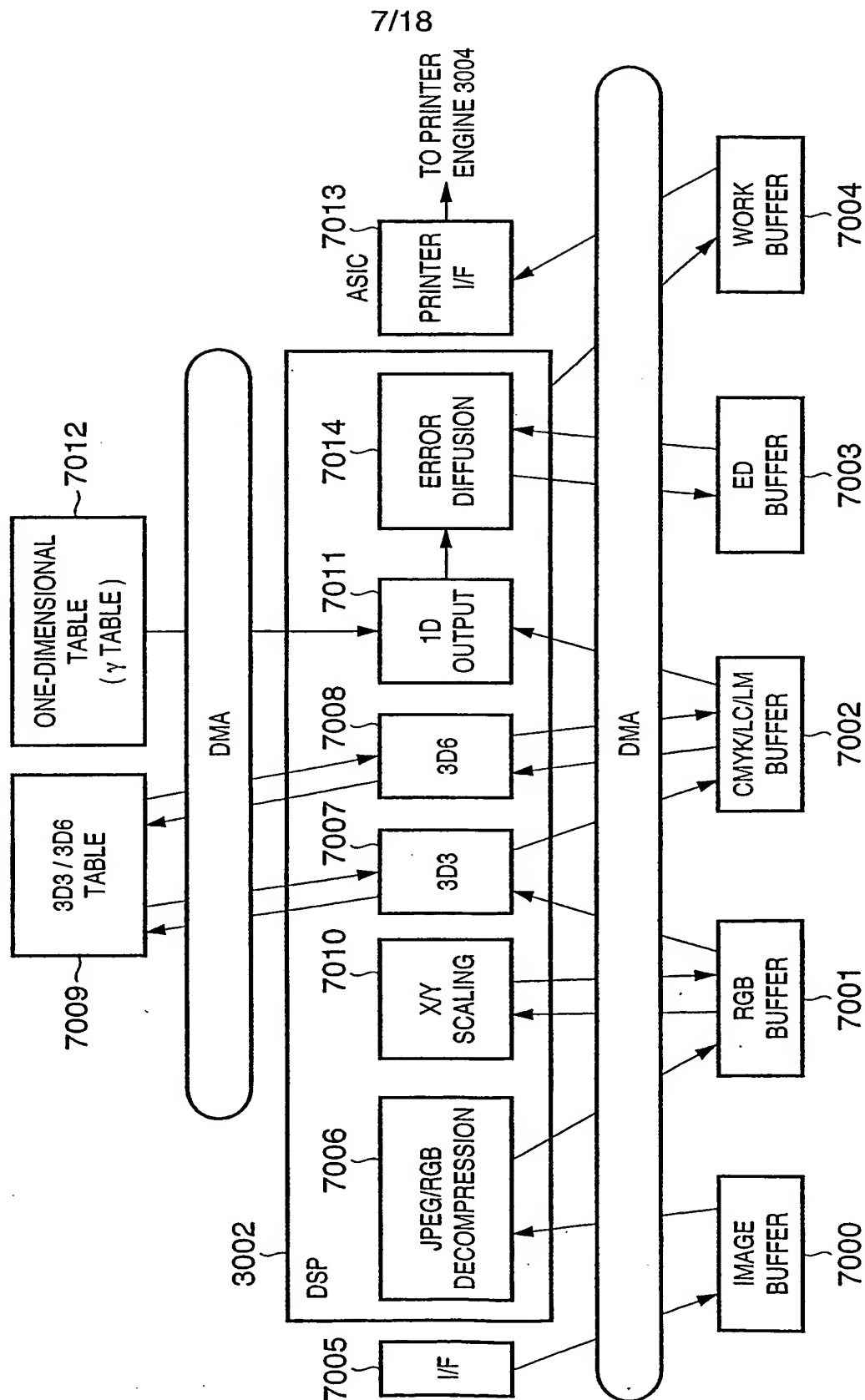
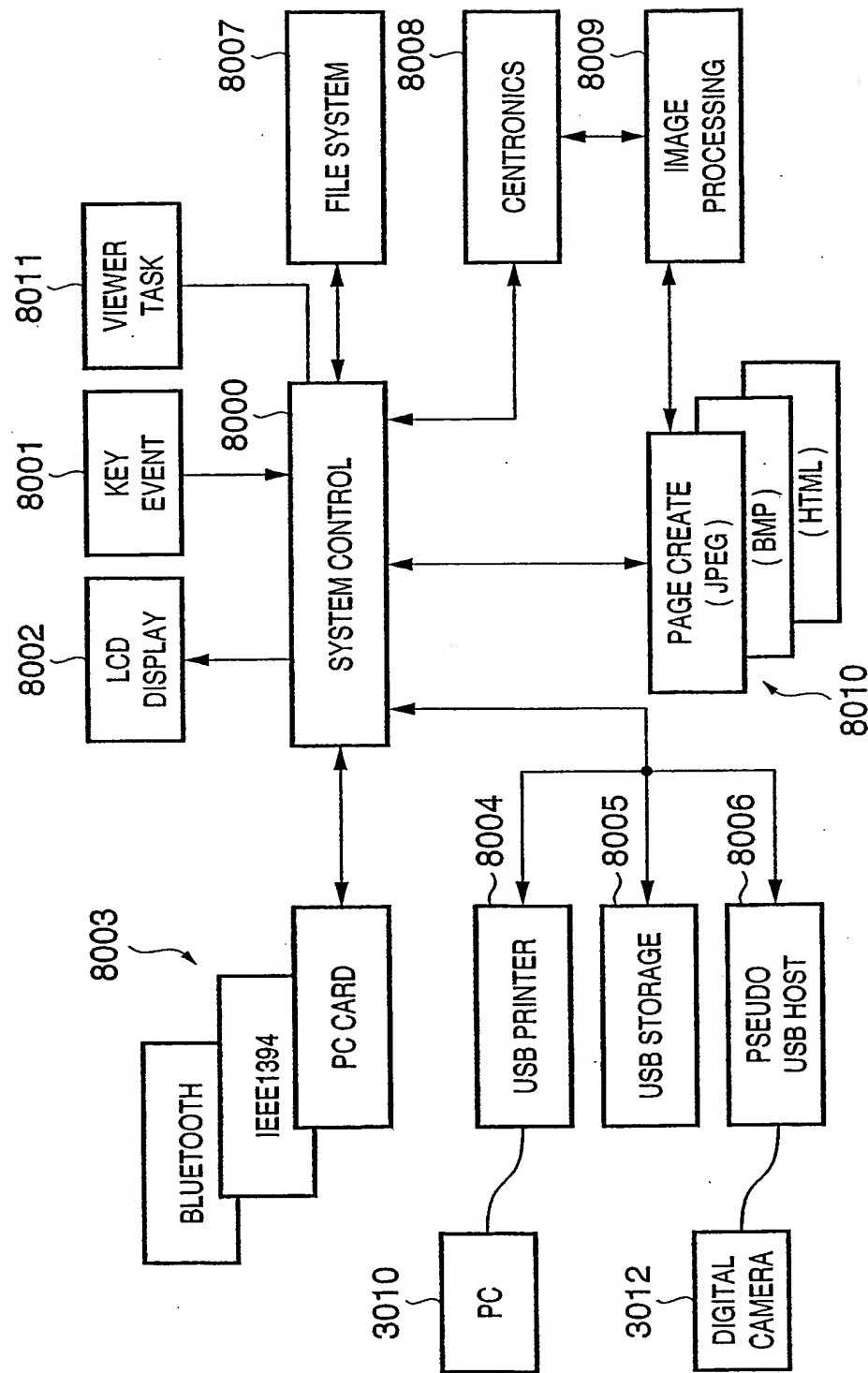


FIG. 7

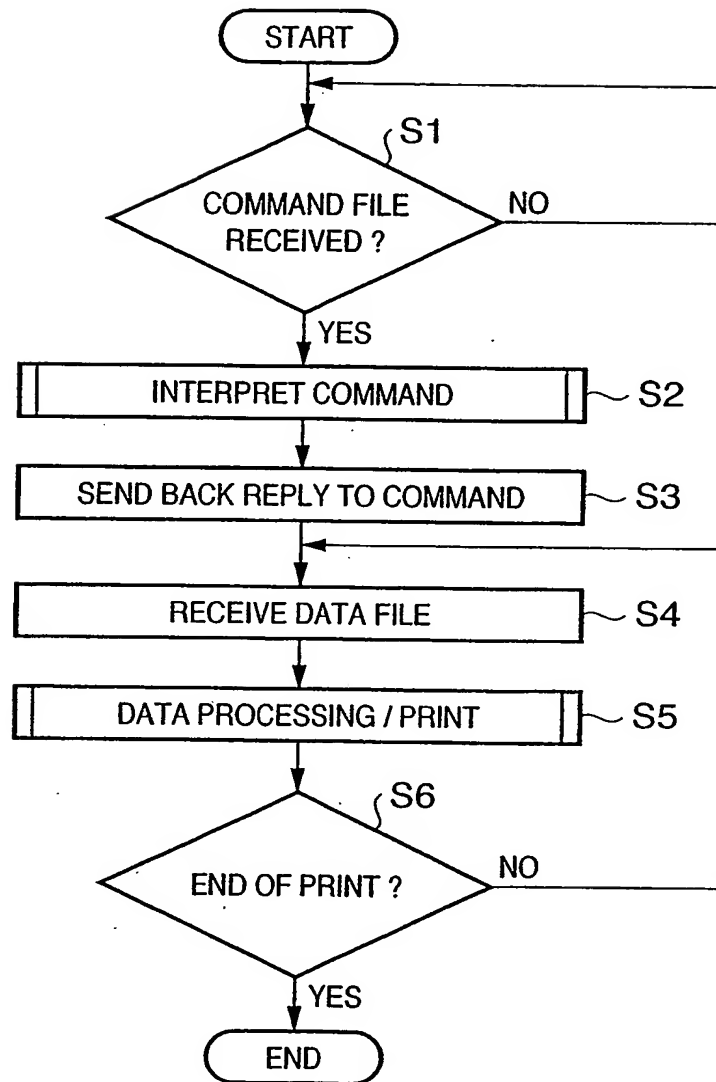


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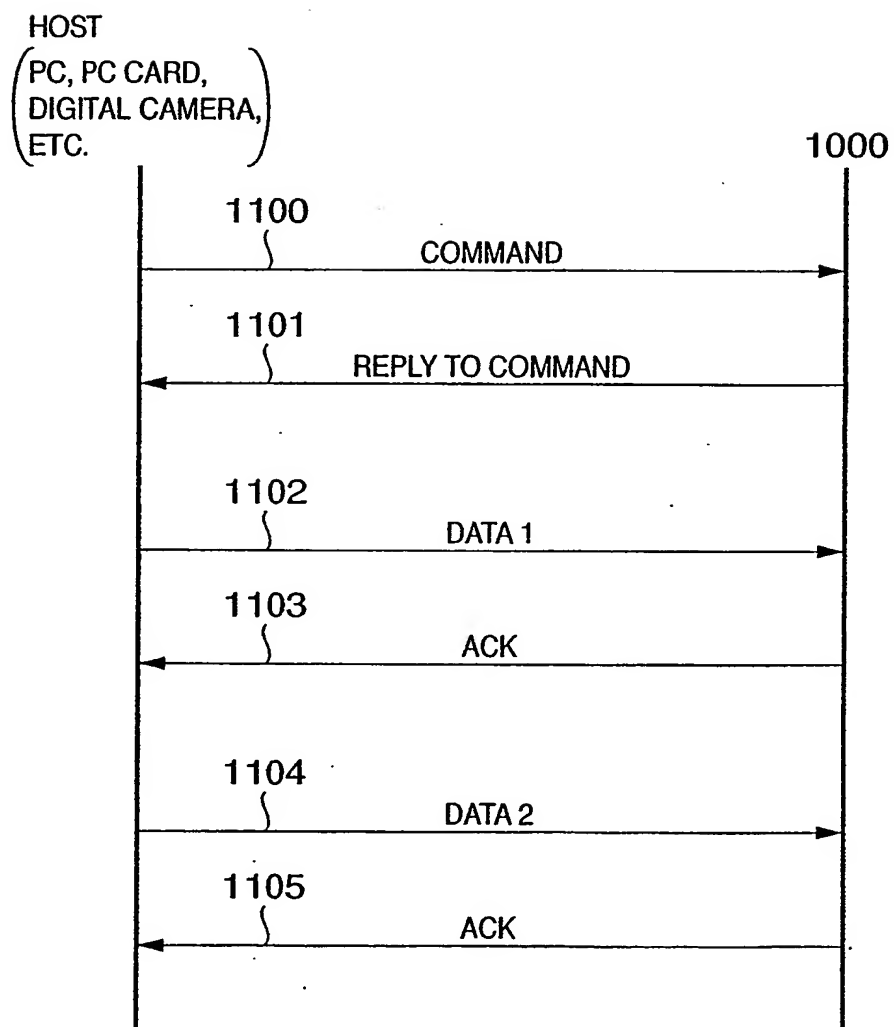
FIG. 8



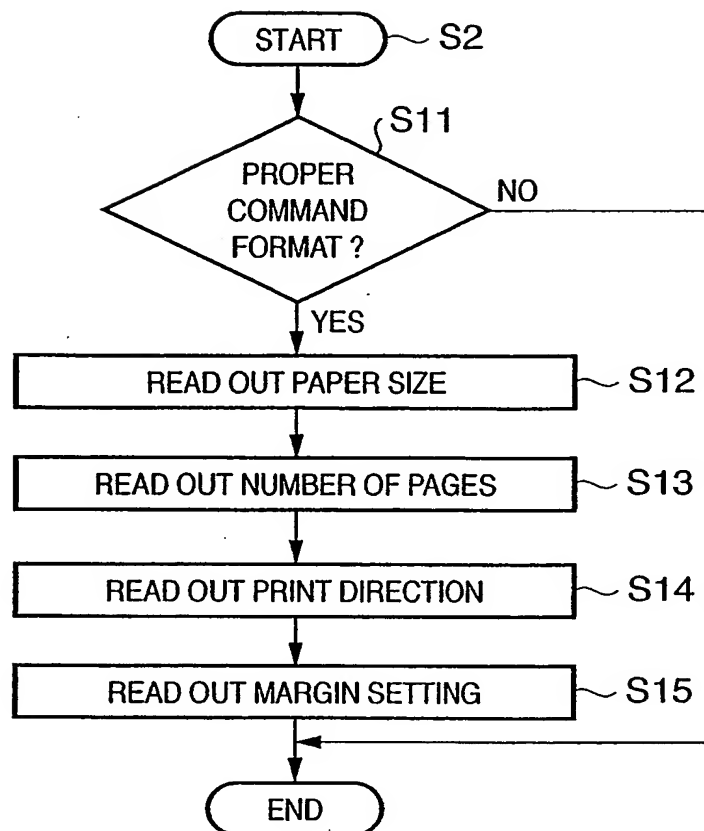
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FIG. 9

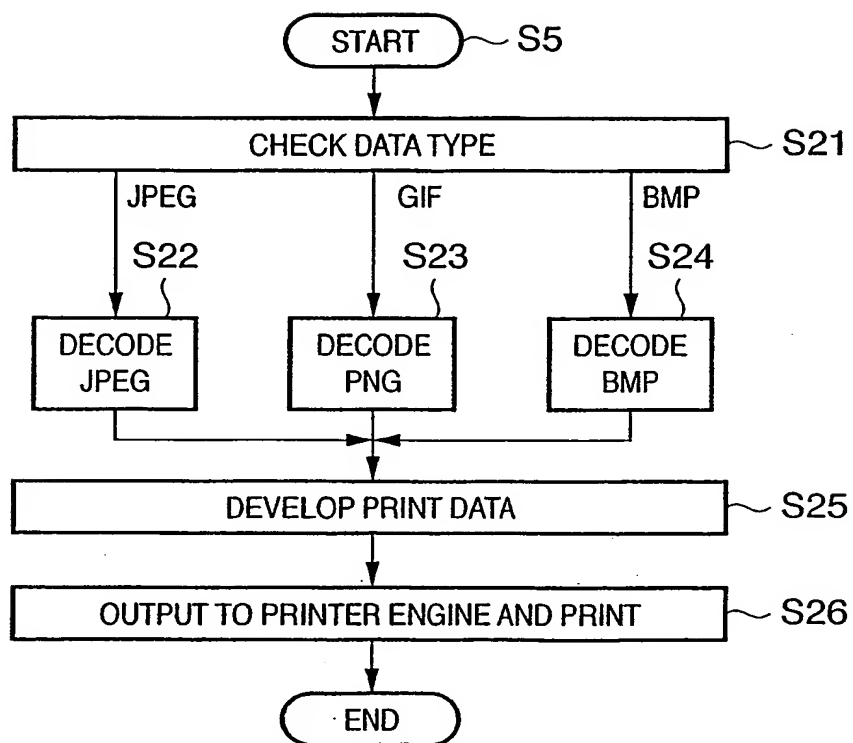
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FIG. 10

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FIG. 11

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FIG. 12

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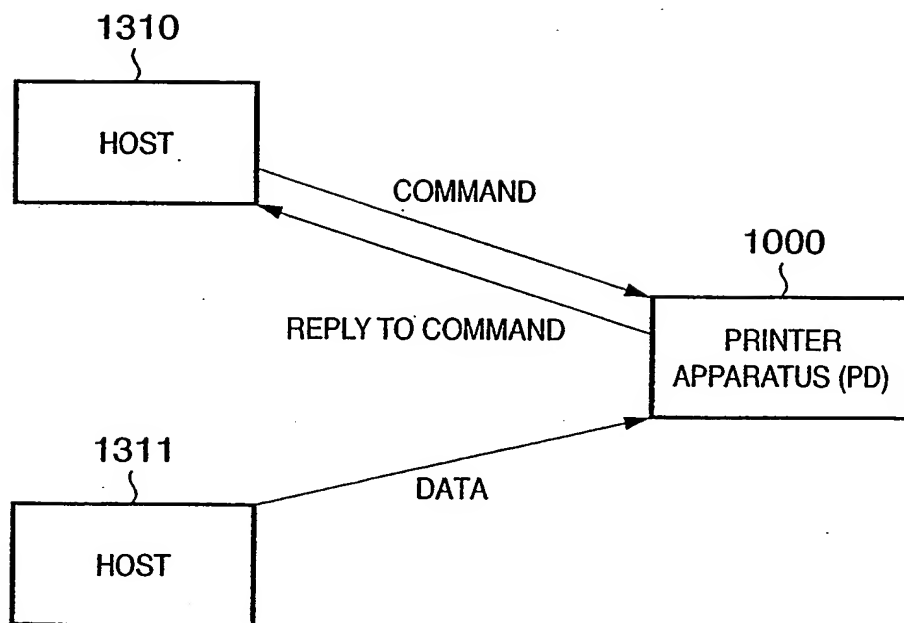
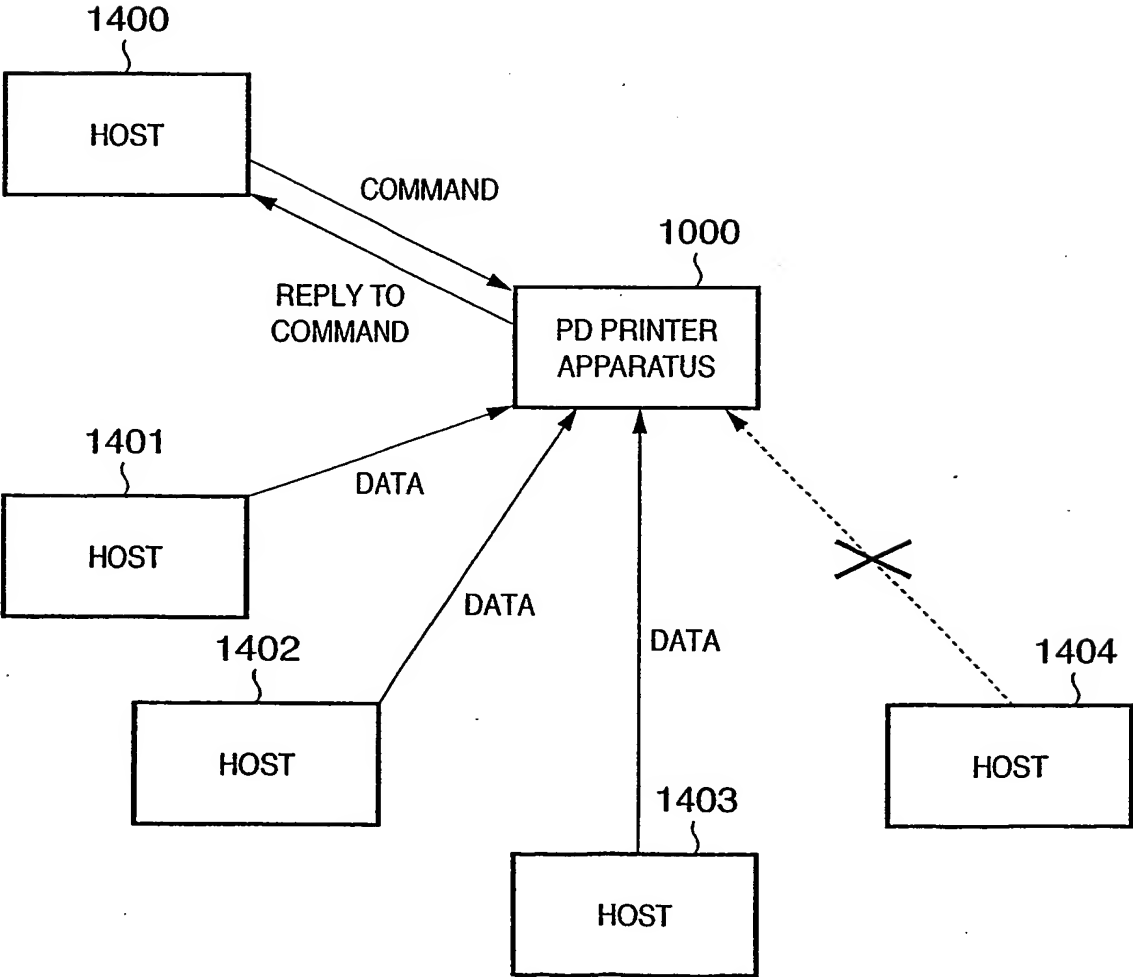
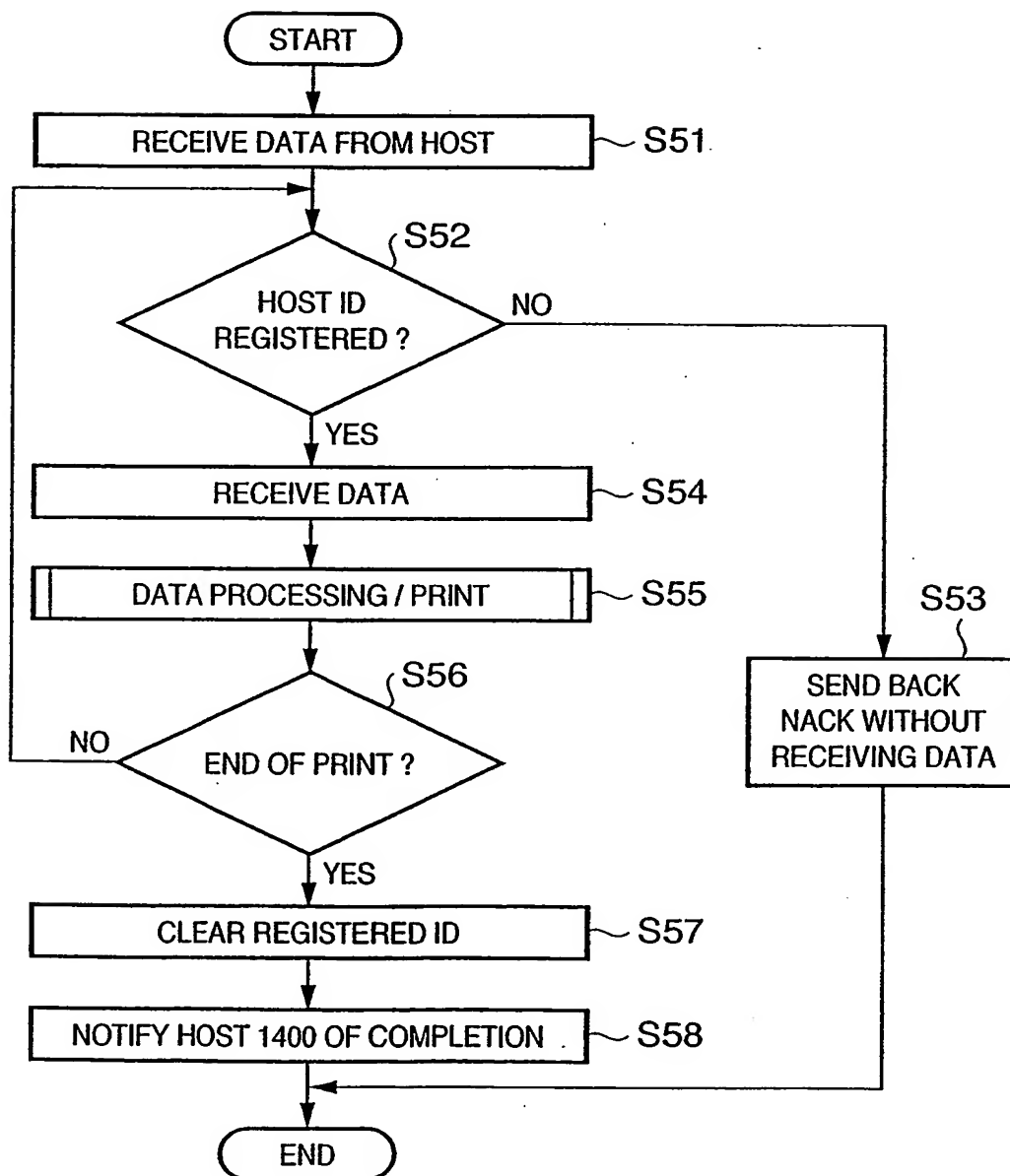
FIG. 13

FIG. 14



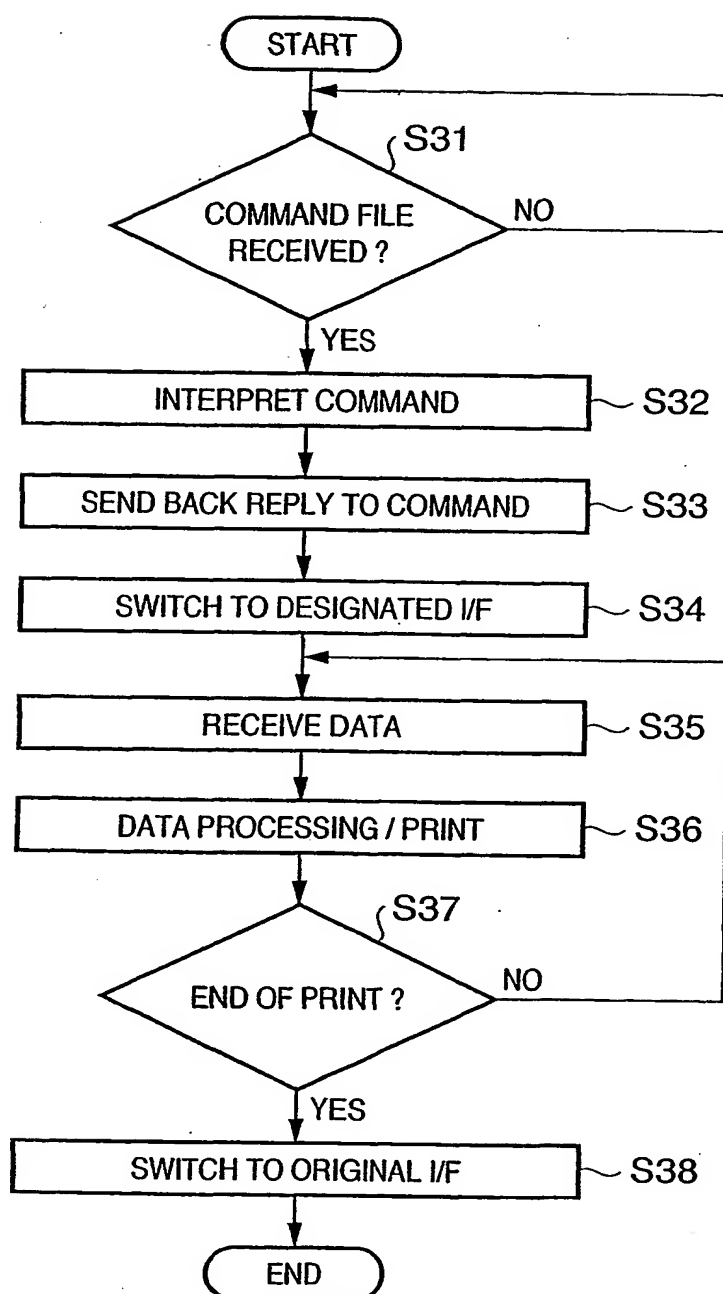
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FIG. 15

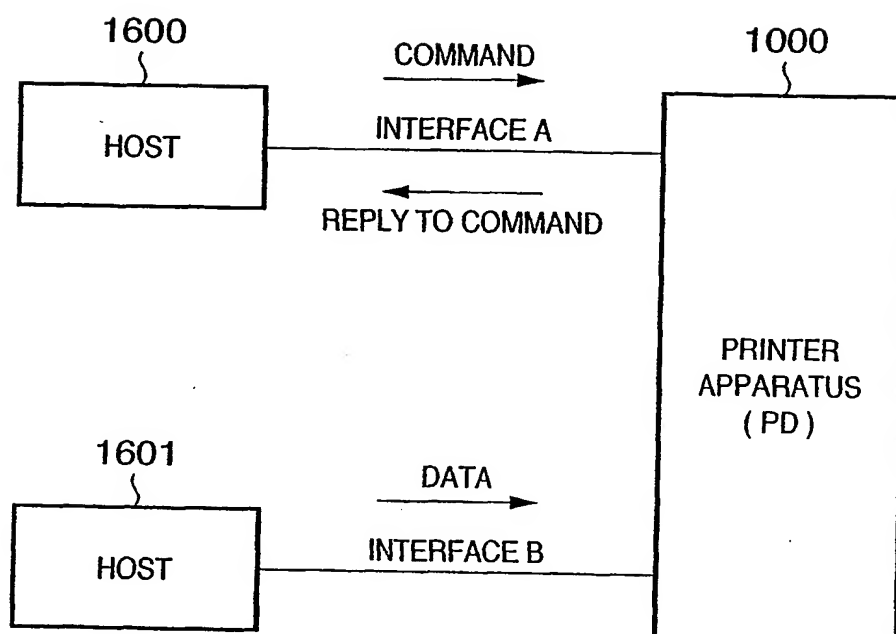


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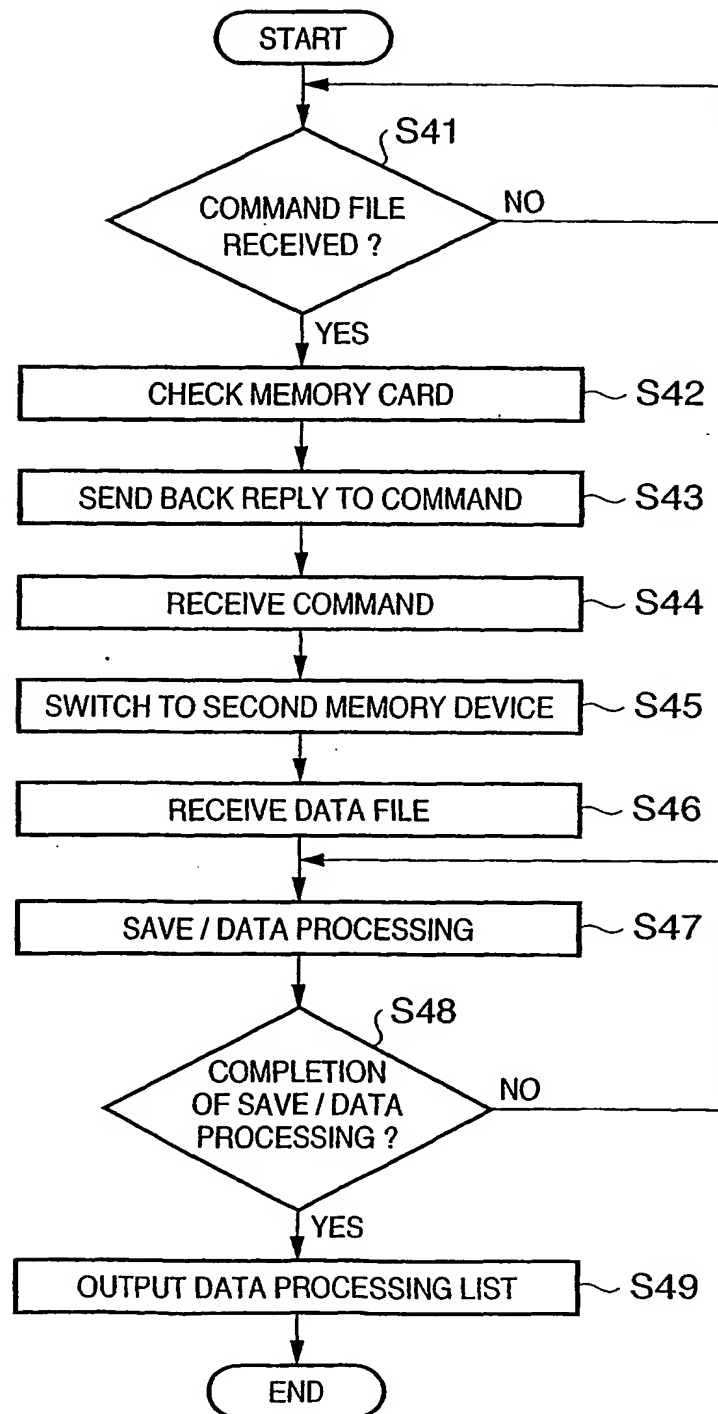
FIG. 16



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FIG. 17

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FIG. 18

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP02/10878

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl⁷ B41J 29/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl⁷ B41J 29/38 B41J 5/30 G06F 3/12

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 Japanese Utility Model Gazette 1926-1996, Japanese Publication of Unexamined Utility Model Applications 1971-2001, Japanese Registered Utility Model Gazette 1994-2001, Japanese Gazette Containing the Utility Model 1996-2001

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	JP 2001-290615 A(NEC Corporation) 2001.10.19, The whole passage (Family:none)	1, 2, 9, 10, 17 , 18 3-8, 11-16
X A	JP 2001-282470 A(canon K.K.) 2001.10.12, The whole passage (Family:none)	1, 2, 9, 10, 17 , 18 3-8, 11-16
A	JP 2000-177210 A(Olympus Optical Co., Ltd.) 2000.06.27, The whole passage (Family:none)	1-18

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

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Name and mailing address of the ISA/JP

Japan Patent Office

3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan

Authorized officer

TERUKI YUMOTO

Telephone No. +81-3-3581-1101 Ext. 3261



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